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STELLATE GANGLION BLOCK AS A LIMB-SALVAGING ADJUNCT IN ACUTE UPPER LIMB ISCHEMIA: A REPORT OF TWO CASES

Emergency Medicine

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ABSTRACT

Background: Acute upper limb ischemia (AULI) is a vascular emergency requiring rapid intervention to prevent irreversible neuromuscular injury and limb loss. While anticoagulation and revascularisation remain standard therapies, sympathetic blockade via stellate ganglion block (SGB) can enhance collateral blood flow and provide a temporising benefit, especially when definitive therapy is delayed or contraindicated. **Case Presentations:** We report two cases of AULI in which ultrasound-guided SGB was used as an adjunctive limb-preserving intervention. **Case 1**, a 38-year-old male with incomplete axillary and brachial artery thrombosis and preserved distal runoff, showed rapid improvement in perfusion following SGB, enabling safe anticoagulation. **Case 2**, a critically ill 58-year-old male with extensive thrombosis, acute kidney injury, severe coagulopathy, and thrombocytopenia, was not a candidate for immediate surgical intervention. Ultrasound-guided SGB resulted in rapid improvement in pain and visible distal perfusion, providing essential stabilization while metabolic abnormalities were corrected. **Conclusion:** Ultrasound-guided SGB may serve as a valuable adjunct in the management of acute upper limb ischemia. By promoting vasodilation and improving regional perfusion, SGB acts as a physiological bridge to definitive therapy in both stable and critically ill patients.

KEYWORDS

Acute upper limb ischemia, stellate ganglion block, limb salvage, sympathetic blockade, ultrasound-guided intervention.

INTRODUCTION

Acute upper limb ischemia (AULI) is a serious but relatively uncommon vascular emergency, comprising approximately 2–18% of all acute peripheral arterial occlusions, with an estimated incidence of 1.3–1.7 per 100,000 person-years (Shalhoub et al., 2012). Delayed diagnosis or intervention may result in irreversible neuromuscular damage, long-term disability, or limb amputation (Blaisdell, 1992). Patients frequently present with the classical ischemic features of sudden pain, pallor, poikilothermia, pulselessness, paraesthesia, and paralysis, with severity dependent on the extent of occlusion and collateral network capacity (Harris, 2003; Creager & Kaufman, 1999). Early management traditionally includes systemic anticoagulation, endovascular thrombolysis, or open surgical revascularisation (Rutherford, 1996; Ouriel, 1998). However, some patients present with significant metabolic derangements, coagulopathy, or organ dysfunction that render immediate invasive intervention unsafe. In such circumstances, adjunctive therapies that can enhance perfusion become critically valuable.

Stellate ganglion block (SGB) induces sympathetic denervation of the upper limb, resulting in arteriolar vasodilation, improved microvascular perfusion, and rapid analgesia. Historically performed using landmark-based techniques (Narouze, 2014), the introduction of ultrasound-guided SGB has significantly improved safety and precision. Although commonly used for vasospastic disorders, complex regional pain syndrome, and digital ischemia, its application in true arterial thrombosis remains under-reported. This manuscript presents two cases of AULI where ultrasound-guided SGB resulted in rapid perfusion improvement, demonstrating its potential role as a limb-salvaging adjunct.

Case Presentation

Table 1. Clinical And Laboratory Comparison Between The Two Cases

Parameter	Case 1	Case 2
Age	38 years	58 years
Arteries involved	Axillary & brachial (incomplete)	Axillary, brachial & proximal ulnar
Distal flow	Preserved	Severely reduced
Coagulation profile	Normal (aPTT 26.3 s)	Markedly deranged (aPTT >190 s)
Platelets	Within normal range	74,000/μL
Renal function	Normal	AKI (urea 165 mg/dL)
Suitability for surgery	Suitable after stabilisation	Not suitable initially
Response to SGB	Rapid improvement	Rapid improvement

Case 1

A 38-year-old male with a history of controlled hypertension presented with a four-day history of acute right upper limb pain, worsening paraesthesia, and progressive discolouration. Examination revealed pallor, coldness, prolonged capillary refill, and diminished peripheral pulses. Radial and ulnar arteries were palpable but weak.

Investigations:

CT angiography showed incomplete thrombosis of the right axillary and brachial arteries, with preserved distal flow indicating collateral patency. Laboratory tests, including complete blood count and coagulation profile (aPTT 26.3 seconds), were normal.

Intervention:

An ultrasound-guided SGB at the C6 level was performed using 8 mL of 0.25% bupivacaine, deposited under real-time visualisation lateral to the longus colli muscle.

Outcome:

Within minutes, the patient experienced significant pain relief, warming of the limb, and normalisation of capillary refill. Fingertip colour improved gradually over the next hour (Figure 1).

Case 2

A 58-year-old male presented with severe right upper limb pain, marked swelling, and diffuse dark discoloration. The limb was tense, cold, and poorly perfused. Distal radial pulse was faint; ulnar pulse was absent.

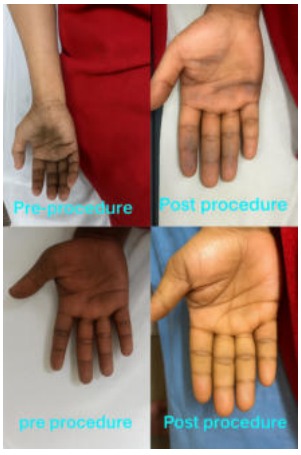

Figure 1. Visual documentation of perfusion response to stellate ganglion block: Pre-procedure images (left) and post-procedure images (right). The upper panel corresponds to Case 1, and the lower panel corresponds to Case 2.

Investigations:
CT angiography demonstrated extensive thrombosis involving the axillary, brachial, and proximal ulnar arteries, leaving only the radial artery patent. Laboratory abnormalities included:
- Acute kidney injury (urea 165 mg/dL),
- Hyponatremia (Na 128 mmol/L),
- Hyperkalaemia (K 5.29 mmol/L),
- Severe coagulopathy (aPTT >190 seconds),
- Thrombocytopenia (74,000/µL).

Immediate revascularisation or thrombolysis was contraindicated.

Intervention:
An emergent ultrasound-guided SGB was performed at the C6 level using 6 mL of 0.25% bupivacaine with careful technique to avoid vascular trauma due to coagulopathy.

Outcome:
The block resulted in rapid pain reduction and visible perfusion improvement. The limb became noticeably warmer, with enhanced colouration. This allowed time to correct electrolyte abnormalities and coagulopathy. After partial correction of aPTT (122.8 seconds), systemic anticoagulation was initiated (Figure 1).

DISCUSSION
AULI represents a time-critical vascular condition wherein rapid restoration of perfusion is key to limb salvage. Irreversible neuromuscular damage may develop within hours if perfusion is not restored (Blaisdell, 1992). While anticoagulation, thrombolysis, and surgical revascularisation are considered first-line strategies (Rutherford, 1996; Ouriel, 1998), systemic instability or profound coagulopathy may delay definitive care.

Physiological Basis Of SGB In Ischemia
The stellate ganglion provides sympathetic innervation to the upper extremity. Blocking this ganglion results in:
- Vasodilation of arterioles and capillaries
- Increased blood flow
- Improved cutaneous temperature
- Reduction in vasospasm
- Rapid analgesia

These physiological effects are well documented in vasospastic disorders such as Raynaud's phenomenon and thromboangiitis obliterans (Narouze, 2014), but literature on its use in true acute arterial occlusion is limited.

Comparison With Literature
Most published reports centre on chronic ischemic or vasospastic conditions rather than acute thrombotic occlusion. The cases presented here show that SGB can provide immediate hemodynamic benefit even in arterial thrombosis with partial or severely compromised distal flow. Shalhoub et al. (2012) emphasised that collateral capacity significantly influences outcome in AULI; SGB enhances collateral recruitment by reducing sympathetic tone. These observations align with the rapid perfusion changes seen in both cases.

Importance Of Ultrasound Guidance
Ultrasound-guided SGB significantly reduces complications associated with landmark-based approaches, including arterial puncture, nerve injury, and pneumothorax (Narouze, 2014). This was particularly crucial in Case 2, where severe coagulopathy increased procedural risk.

Clinical Implications
1. As A Temporising Measure:
SGB can maintain or improve perfusion while the patient is optimised for surgery or thrombolysis.

2. As A Rescue Therapy In Unstable Patients:
In Case 2, SGB allowed time to correct metabolic derangements.

3. As An Adjunct To Improve Outcomes:
Improved perfusion before definitive interventions may reduce tissue damage.

Novelty Of These Cases
- Case 2 represents an exceptionally high-risk scenario with coagulopathy where invasive procedures were unsafe.
- SGB served as a limb-salvaging bridge therapy.
- Real-time photographic documentation (Figure 1) visually confirms perfusion changes.

These findings expand the current understanding of SGB as a viable adjunct in AULI management.

CONCLUSION
Ultrasound-guided stellate ganglion block is a valuable adjunctive intervention in acute upper limb ischemia. It offers immediate improvement in pain and perfusion, particularly beneficial when definitive revascularisation is delayed or contraindicated. These two cases demonstrate that SGB can serve as a physiologic bridge, enhancing collateral flow and stabilising the limb, thereby preventing progression to irreversible ischemia. Further research is warranted to establish standardised protocols and identify patient populations most likely to benefit from this intervention.

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